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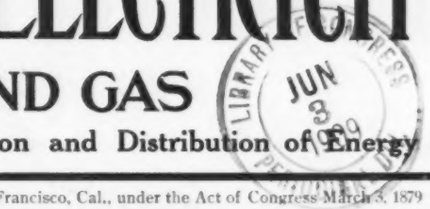

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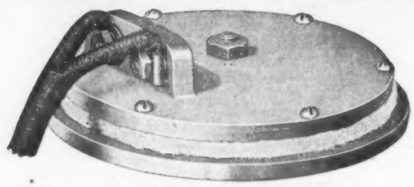

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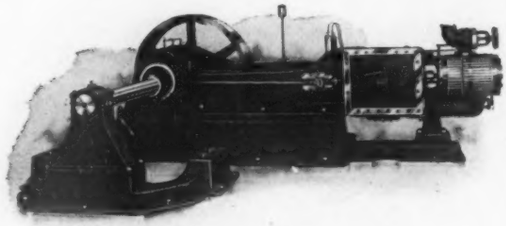

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JOURNAL OF ELECTRICITY
POWER AND GAS
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VOLUME XXII. SAN FRANCISCO, MAY 22, 1909. NUMBER 21

THE REAL PURPOSE OF THE AIR BRAKE.[1]

BY W. S. BARTHOLEMEW.

PART I.

In this paper will be stated the real purpose of the air brake and the method by which this purpose is accomplished. The average person thinks that the air brake is designed merely to stop trains. That was the primary intention, but, as a matter of fact, the field, scope and usefulness of the air brake has broadened today until it is applied to electric cars, passenger trains, and to freight trains for purposes (other than the mere stopping of the trains) which primarily nowadays are so far more important that air brakes would be applied to the trains almost without regard to the expense involved for these other purposes which I will mention.

Type of Locomotive Used in Demonstration.

On electric cars, for instance, in which you are more interested, I think I am safe in saying that the most important feature calling for their application to the average electric car and electric train is the question of time. It would be absolutely impossible to operate cars and electric trains—cars coupled together in trains—on what we call a "short schedule" without air brakes. Many tests have been made along that line which I need not mention, but simply developing the fact that with four motors on a single car, for instance, a motor on each axle, it is possible to get a rate of acceleration in miles per hour per second three or four times as rapid as a stop can be made with the hand brake; and to have the rate uniform in acceleration and—to coin a word—deceleration, it is necessary to employ some power worked through air or some other scheme to secure retardation with as uniform and rapid a rate as acceleration has taken place, and with that accomplished, a short schedule can be made; and that applies to cars operated either singly or in trains.

The next important feature is the matter of current expense. There was a test made in Boston in which I was interested at one time which showed two cars running on the same schedule on Washington street. It required 10 per cent less current to operate the cars with air brakes than cars within a few feet of it with hand brakes. The reason was that the motorman with the hand brakes would keep his hand brake partially set up for fear of running into a team or on a dangerous crossing; whereas the car with the air brakes could be operated with the brakes entirely released.

[1]Paper read before San Francisco Section American Institute of Electrical Engineers, November 27, 1908.

Lastly, is the factor of speed. I shall inadvertently slip into the use of air brake language; I can not help it; and in order that you may be familiar with what I am trying to tell you what we mean in the air brake art, I shall explain the various terms. When we use the word "emergency" we mean that the air brake is to be applied for the purpose of saving life or property. For no other purpose is the emergency application of the brake used. There is almost an entirely different action in "emergency" than in "service."

When it comes to passenger trains, it would be absolutely impossible to operate a train like the twentieth century limited, or the New York-Pennsylvania special without the air brake. You will be interested to know, for instance, that in the case of a train not long since on the Boston and Albany going from Albany to Boston—not a very great distance, as distances go out in this country, there was a failure of air supply, which put the air brakes out of commission, and they operated the train with hand brakes, which caused a loss of time of exactly three hours between Albany and Boston. That illustrates the point that air brakes are applied to trains today for other purposes than to save life and property—in other words, to save time. With passenger trains, as with electric cars, to maintain schedules in suburban service or high speed service without some device like the air brake, would be impossible. And in train operation we have another element: Our trains reach such length that we must secure some method of operation in stopping and handling the train en route for slow-downs and stops finally which will handle the train smoothly. One of the great difficulties in handling trains is in the internal pressure and shocks to the train; and the air brake must be so designed that we can handle the train the same in retardation as we can in acceleration; and some of the latest and most important improvements in air brakes have been along those lines. Finally, on passenger trains the air brake is now applied for safety purposes and it is considered the most important appliance in the list of those which are required by law now to be on trains.

In the case of freight trains, there is the question of handling traffic, handling it first as traffic tonnage and then handling it with safety and without danger. In some parts of the report that I shall touch upon later in the talk you will see what the air brake has to do primarily with the question of handling traffic in tons. Anything that can be done to increase the carrying capacity on single-track divisions is, of course, important and valuable to a railroad company in dollars and cents.

The air brake and the electric arts are two arts that have been developed in our lives and contemporaneously; and in some of the features of development they have been very similar. The air brake, it is true, had a little start over the electrical art, as far as the general use of the device is concerned, but there are some features that appeal to me as very similar and having characteristics common to both. In the development, for instance, of your lighting system, you remember when we had our little isolated stations, and then the central station, and then a remote power plant, and then a more remote power plant, and each type of installation would be construed by you, in discussing your art, as representing an epoch. In developing your electric railroads, you had your single-truck car and then your double-truck car, and then a trailer, and then they wanted a train of trailers. It took a genius like Mr. Sprague to apply the multiple unit control. Imagine, for instance, what kind of result there would be if we had trains made up of two or more 4-motor cars with a trailer in between with a separate motorman on each motor car, trying to get all the motormen to do the same thing at the same time. Now, what are the common characteristics in those epochs that would be similar to the air brake art? It is those peculiar characteristics of each epoch which had to do with the distribution over large areas or distances. The air brake has been developed through similar epochs. You would be interested to know that the air brake started in about 1868 or 1869, and its use was confined practically to short passenger trains; no great use at that time was made of the air brake on freight trains; and the air brake at that time was called "straight air."

I will show a little later what the difference is between the air brake then, and what it is today. When we began to apply that type of brake generally we ran against some inherent difficulties and the one particular thing which was a fatal defect was that it had a very low factor of safety when we applied "straight air" to cars connected together in trains. By "straight air" we mean simply a set of piping through the train connected to the brake cylinders through which the brake cylinders are connected up with the air supply on the locomotive and the air admitted direct to those cylinders to apply the brake shoes to the wheels. You can readily see that if the main pipe became disabled the whole system went out of commission; and there was no warning of danger until they came to use it. The second inherent difficulty with that type of brake was what I wish to term, and which I shall use throughout the talk to some extent, the "serial action time element." We mean by that, the time at which an action occurs on each vehicle in the train. Now, with straight air, and with the very small piping which they used on the cars at that time—say half an inch, or not to exceed three-quarters of an inch for the main pipe line, as against the standard of one and one-quarter inches today—between the application on the first car and the fifth and those behind, there was a difference in time that made an internal shock that was very great. So that it was not long before a requisite was apparent for something different. Mr. Westinghouse perceived it and proceeded to develop what we now call the "automatic brake."

It was then, and is now, called the plain automatic brake; but, before I touch upon that particular feature of it, I want to tell you the dividing line between the epochs to correspond, in a sense, to those I have mentioned as being in your art. When we came to apply the air brake to freight trains, which were at that time not to exceed 30 cars long, it was almost impossible to get satisfactory results from a straight air brake; so that we had then a plain automatic brake, which was designed for use on trains up to 30 cars. When this brake was used to some extent—probably 150,000 or 200,000 in use, which was a good many at

that time (that was in the early '80's)—it soon became evident that even its action through a 30-car train had shortcomings, especially as far as emergency action was concerned, and the railroads began to feel this shortcoming; and it became necessary to develop a function in the equipment to care for longer trains. This was termed the "quick action" feature. Then they were ready for a 50-car train, and that brake was developed about 1887 and continued to serve satisfactorily up to the time that 50-car trains ceased to be the common standard. When we got to 80 or 90 or 100-car trains it was just as necessary to have some further improvements as it was to step from 5 to 30 or 30 to 50-car trains. We have common today 80, 90 and 100-car trains; and all our experiments made this summer were made with 80-car trains. So that the individual characteristics of the air brake of those epochs, of the 5-car, the 30-car, the 50-car and 80-car trains have to do with the securing of action through an extended length of train, just as your development in the lighting and electric train operation has changed in characteristics from one type of operation and one type of lighting system to another.

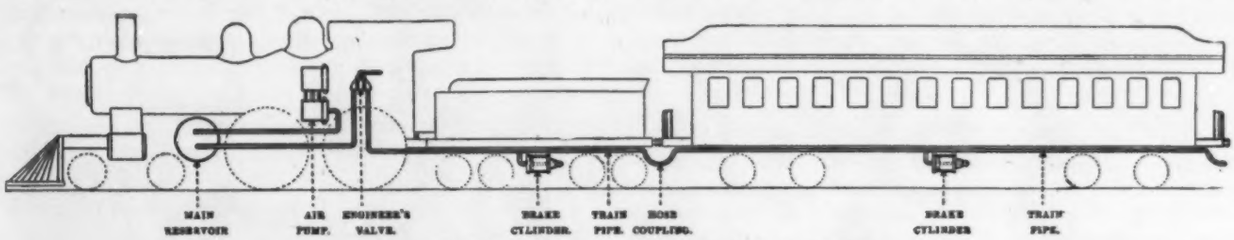


Fig. 1. The Straight Air Brake as Applied to a Train.

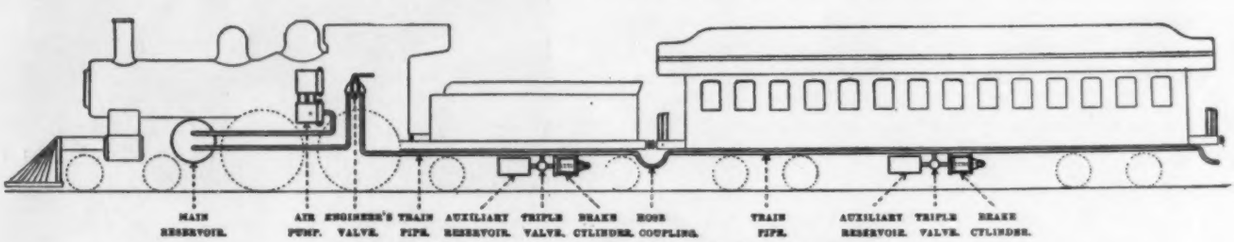


Fig. 2. The Automatic Air Brake as Applied to a Train.

In the electric art you have the advantage of having electricity instantaneous in operation through very extended areas; but when we come to work with compressed air, with which some of you are more or less familiar, you appreciate that we get a new element—a time element—which you do not have in the electrical art. We have one thing that is quite similar, and that is, that we have a loss at the end of the line, which we call a "differential." You call it in your art, I believe, a "drop" in the line. We have known, of course, since we began to use compressed air, that the differential existed, as the entire operation of the air brake depends upon the differentials of pressure, but we have only developed the art within the last few years to utilize the differential which exists between the pressures in different parts of the brake pipe itself to perform valuable functions. On the train this summer on which we made our demonstrations there was a brake pipe 3,700 feet long, the natural friction in which, of course, created a differential between front and rear end. In order to explain what we mean by this differential in the brake pipe itself, I want to mention that when we have this 3,700-foot brake pipe line charged to 80 pounds and we would lower that pressure 5 or 10 pounds with the desire to get a corresponding reduction at the back end, with electricity the action would be instantaneous, but with compressed air it sort of tapers off until it remains unchanged temporarily, at least, at the rear end, either up or down; so that we would have a sort of triangular pressure, say 70 at one end and 80 at the other, and we would have a gradually developing differential through the pipe in either direction. Part of what I will tell you tonight will have to do with this peculiar condition of the differentials in the brake pipe.

Instead of considering that as a shortcoming and something that we regret exists inherent in compressed air for this purpose, we now use it. We now make the triple valves; and they are called so because they do three things: They charge the system, they make the brake application and they release the brake cylinder pressure that has applied the brakes through levers. We make the triple valves upon the front end of the train perform one function, two functions or three functions instantaneously, as far as they are concerned; whereas, far back on the train, where the differential perhaps does not exist, they are doing entirely different things at that time. You will appreciate, as engineers, that during the advancement and development of the air brake art, there was a time that we did not use that differential as we do now and it existed as a shortcoming in the equipment and a stumbling block to the securing of the satisfactory results that we desired. But now we have developed the equipment to use these differentials in the brake pipe to meet present-day operating conditions.

There is another point that I would like to mention in regard to the comparison between the electric art and the air brake art, and that is the wonderful standardization that has, of necessity, been maintained. It constitutes with us an engineering difficulty. When you work out problems in your line, if you have individual necessities in some installation, long distance transmission, some climatic condition, or something of that kind, you can treat it specially according to

the particular features of the physical conditions pertaining, and also according to your own ideas of what ought to constitute the proper treatment for those conditions. Now, with our art we are limited; and we are limited by five very important things. What would you think, for instance, of being obliged to make everything standard with and work with every electrical installation that has been made since 1887? In our art every air brake that is developed, every installation that is made, must work absolutely harmoniously with every installation that has been made since 1887; and some of them as early as 1883 will still work harmoniously with the air brake installations of today. That has done a great deal to stultify and keep down development in our line. It has made it impossible for the art to spread out. There are a dozen different ways, perhaps better ways, of doing the things that I am telling you about tonight as having been done; but when you see the five limitations that a new man in the art, starting out independently to work at the air brake, has to meet, he has a pretty hard fight, and we are up against the same thing. We would like to throw all of the old ones away and start anew, but with 3,500,000 installations we are limited as follows:

First, there are the hose connections, and by that we mean the entire pipe throughout the train. The hose connections are there and every car, passenger or freight, in the United States, from the White Pass & Yukon railroad in Alaska to the Florida East Coast railroad in Florida, can meet any one of the other 3,000,000 or more cars in the night and be coupled together and operated. Those hose connections must be used; they will not allow us to change them. Every air brake must work on those present hose connections. That is settled and settled forever, and they will probably remain as long as we all live, that probably can not be changed.

The second condition that exists is: All improved air brakes must work with the old equipment. In fact, the very first question that is always asked when we come to explain a new development in the air brake art is: "Will it work harmoniously with those already on the cars, especially foreign cars?' Mr. Kruttschnitt said to me: "Suppose we change all the Harriman lines cars? Sixty-five per cent of our cars are foreign cars"—and by foreign cars we mean cars from another road—"65 per cent of the cars going over the mountains are cars of other roads. The foreign car installations in that particular train are in the majority, and, unless we get all the other cars in America to change"—which, as I said just now, consists of about 3,500,000—"we could not do anything." I explained that the improved equipment not only would work with the old harmoniously, but that it would improve the operation of any and all equipment on the balance of the train.

The third and more important thing is: They must not only work harmoniously, but they must be capable of being interchanged. The car builders have rules for standards which require that if a triple valve becomes defective, the road on which that car then is can apply its triple valve in place of it. That makes it a necessity that the triple valve in use by any road must go on to the cars of any other road; I mean physically; not only work with, but physically interchange; they must meet the master car builders' conditions.

The fourth condition is that any improvement which we inject into a piece of air brake apparatus must, of necessity, make an improvement in the operation of the old equipment that might happen to be on the adjacent vehicles, i. e.: During the transition period, for instance, we must begin to get the benefit of any improvement not only on that particular vehicle on which the improvement actually exists, but the improvement must be spread over the entire train in which that vehicle might happen to be, and the greater the extent to which it is spread on all that train by the effect of the improvement being on only a few vehicles in the train, the more important that improvement is.

The fifth condition which limits us is that any improvement which may be designed must be of such nature, such design, such style and physical construction that the old equipment can be taken into the works and have those improvements added without the necessity of discarding much, if any, of the old apparatus.

A Demonstration Train. The Dynomometer Car Follows the Tender of the Locomotive.

When you come to consider those five limitations you will begin to appreciate why the air brake art has been limited in America to one or two companies. The equipment for freight cars which we supply absolutely meets all of the conditions which I have outlined.

We have in our archives in Pittsburg many improvements. Some of them we have not used and on which the patents have run out. They did not meet two or three of the limitations that I have outlined. There is not very much encouragement, therefore, for an air brake inventor. A new air brake was explained to me by one of the officials of the Southern Pacific Company that has excellent features. But there is no possibility of its being marketed, as a general proposition. They might be used in some particular place under some special conditions where they might use special equipments; but, outside of such special conditions, so far as general interchange throughout the United States is concerned, we must absolutely be confined to the five limitations outlined.

As I said, just magine in your art making every dynamo, motor and transmission line interchangeable since 1887. It would be an absolute impossibility in your art. But we are confined in our art to those

particular things, to the disadvantage of the air brake art.

You will be interested, however, in learning that we have reached the parting of the ways, as far as passenger equipment is concerned.

When we had passenger cars weighing 60,000 to 80,000 pounds each and speeds of from 20 to 40 miles per hour, we had conditions that made it necessary for us to do certain things; but when we double the weight of that equipment and double the speed, we find entirely new conditions coming in that we have been obliged to meet, and the new and improved air brake on passenger trains will not meet the five conditions only in that it will not physically interchange with the old simply because the passenger cars remain on the home line with very limited exceptions and the foreign car interchange is not as important a consideration as in freight trains. The Pullman company, in adopting the new equipment, opened the way for other roads to utilize them, the new and old equipment harmonizing perfectly, so far as operation is concerned, the Pullman cars constituting the great part of the foreign cars in passengers trains.

Another difficulty that confronts us in the use of compressed air as against electricity, for instance, is the time necessary to restore the pressure. In electricity the moment you shut or open a switch you have a change instantaneously; but the moment we open a valve we get a time factor that is almost impossible to avoid before a differential occurs. Those are some of the difficulties we are confronted with.

I might confess here also that there are inherent shortcomings in the air brakes; but we have permitted them to remain exclusively on what we call the "release" side of the equipment—shortcomings that are a necessity in the development of the art through the engineering difficulties that exist—some of which I have mentioned. The time element that comes with the use of compressed air makes it impossible to do one thing as quickly as another, and if we have a choice we always leave that shortcoming on the release side of the equipment. That is the reason why you have been delayed many times by what the train men call "stuck brakes." It is a good deal harder to get the brakes off than on. But some of those inherent defects are in there because nobody can help it, because the limitations of the art which I have outlined are such that it is impossible to do everything as well as we should like to do it.

Some people, in fact most people, have an idea that the air brake is kept off in some way by a set of springs on the car. There is such a brake in which the compressed air holds the brake shoes away from the wheel and a spring applies it; and there is also an air brake that has been developed in which the air holds it applied and the spring releases it. But in the air brake as we commonly understand it, neither occurs in a certain sense, the only springs used are the springs to overcome the natural friction which would cause the shoes to lie up against the wheels by gravity. The brake shoes are suspended by perpendicular hangers and they do not always come as free from the wheels as we should like. We must overcome that spring before we can get the shoes up against the wheel to do business. To that extent only do we use springs in the air brake today. The release spring merely has to do with the preventing of the parts remaining at rest in a certain position.

(Part II of "The Real Purpose of the Air Brake" will appear in our issue of May 29th.)

EMPLOYES TO BECOME STOCKHOLDERS.

Mr. Jay P. Graves, president of the Spokane & Inland Empire Electric Railroad Company, operating interurban lines in Washington and Idaho and power plants in and near Spokane, has addressed a letter to the officers and employes of the entire system, setting forth a plan by which they may become stockholders and share in the company's profits. The letter follows:

"A number of corporations in the United States, have, during the last few years, adopted plans whereby their employes were afforded opportunities for acquiring their stock or securities on safe and easy terms, believing that thereby employer and employe were brought closer together to their mutual benefit.

"Believing thoroughly in the principle, and desiring to bring about and maintain between this company and its employes a community of interest and consequent good feeling the company has arranged with the Union Trust Company of Spokane to supply to any officer or employe of the company shares of its preferred stock at the going market price, plus an interest which may have accrued on the purchase price between the time of purchase by the trust company and its sale, and a commission of 5 per cent on the amount purchased. No profit is made by the trust company except the commission, it purchasing the stock in the market and selling it to the purchaser at cost.

"Easy terms will be made, the purchaser paying not less than 15 per cent of the purchase price in cash, and the deferred payments being arranged to suit the purchaser, provided that not longer than five years' time will be allowed, the deferred payments bearing interest at 5 per cent per annum. In case the purchaser becomes sick or disabled, leaves the service of the company, is discharged, or dies before the stock is paid for, the Union Trust Company will, if requested to do so, cancel the contract and repay to the purchaser, or in case of death, to his heirs, all sums paid on account of the purchase price. After the purchase is completed, the company will, in any of the events above stated, take the stock off the hands of the purchaser, or his heirs, at the price paid for same, plus 5 per cent per annum interest and less any dividends on the shares that may have been paid.

"The par value of the shares is $100, the selling price by the trust company to be the cost plus commission and interest. Holders are entitled to dividends at the rate of 5 per cent per annum before dividends are payable to holders of the common stock. Above 5 per cent, up to 7 per cent the two stocks share equally in dividends. The shares are redeemable at any time by the company upon the payment of $135 a share and accrued dividends. Owing to the recent financial depression, it is believed that the shares can now be purchased for less than par."

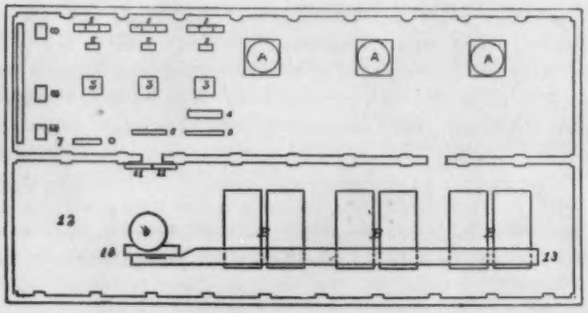
Mr. Graves states that the company's object in offering the foregoing plan is that the employees may become interested in the enterprise and better their condition by sharing in its future success, adding:

"The arrangement entered into with the Union Trust Company provides the most liberal terms, the credit of the Spokane & Inland Empire Railroad being back of every employe wishing to purchase stock on time payments."

GATUN POWER PLANT.

One turbine in the power plant at Gatun, Canal Zone, has been erected and is ready to be tested as soon as steam can be supplied, and two others are being placed in position.

All the other work preparatory to laying concrete in the locks at Gatun is ahead of the power plant, so that the completion of this plant is the determining factor in the beginning of work on the locks.



Floor Plan. Gatun Power Plant.

A—Three turbo-generators
B—Boilers.
1—Three sets of transformers, three transformers in each set.
2—Three reactance coils, one to each set of transformers.
3—Three rotary converters, one to each set of transformers.
4—Controlling benchboard.
5—Exciter switchboard.
6—Feeder switchboard.
7.—Air compressor, motor driven.
8—Oil switches, one for each turbo-generator and rotary converter.
9—Stack 9 feet in diameter.
10—Induced draft fans.
11—Oil filter and storage tanks.
12—Machine shop.
13—Breeching connecting the boilers to induced fan system.

The power plant in question has a dual purpose. Primarily it will furnish the power for running one single and two duplicate unloading cableways which operate over the material wharves, and the cement, rock, and sand storage piles; operating the electric cars which will carry materials to the concrete mixers; running a battery of eight 2½-cubic yard cube concrete mixers; running the cars that will carry concrete from the mixers to the unloading cableways which stretch across the lock site; supplying power for operating four duplex cableways which will take the concrete from the cars and deposit it at any point desired in the lock-site, and supplying current to three 20-inch centrifugal dredge relay pumps, motor-driven, for the hydraulic construction of Gatun Dam. Its secondary use will be to supply electric current for lighting Colon, Cristobol, Mount Hope, and Gatun, and power for running the manufacturing plants of the Subsistence Department at Cristobal. After the Canal is in operation, it will be held in reserve to operate the locks and towing machinery, in case the hydraulic power plant should fail, either from accident or from lack of water. The hydraulic electrical power plant will be run by water wasted from Gatun Lake, while the electrical plant which is now being erected will be run by steam. The building for the power plant is nearing completion and all machinery excepting the boilers is on the Isthmus.

The power plant at Gatun will occupy a building 150 feet long, 77 feet wide, and 48 feet high from the ground floor to the peak of the gables. The building is in two parts, each part having a gable roof, and running parallel with the other, the dimensions of each being 150 feet long, and 38½ feet wide. The substructure is of concrete and the cellar is lined with concrete, while the superstructure is a wooden frame, the closed parts of which will be covered with corrugated iron. A floor plan showing the location of the principal pieces of machinery is appended.

The equipment of the boiler room will consist of six water-tube boilers of the Keeler type in three batteries of twos. Each boiler has a nominal rating of 400-horsepower, is equipped with Foster superheaters, and will generate steam at 205 pounds absolute pressure and 150 degrees Fahrenheit of superheat. It is the intention to use crude oil as fuel, and to this end the combustion furnaces are very large, but they are also fitted with Ajax shaking grates in order that coal may be used if the emergency arises. The induced draft system includes two 90-inch fans, located near the stack, one directly connected to a vertical compound engine, and the other to a 100-horsepower induction motor. The induced draft fans are located on a balcony in the boiler room, on which are also located two lubricating oil filter and storage tanks. The equipment furnished under the boiler contract also includes two vertical boiler feed pumps and a Cochrane open feed-water heater and purifier.

In the engine room will be located three Curtis 1500 k. w. vertical steam turbine base condenser generators, oil pumps, vacuum and circulating pumps, and accessory machinery. A general idea of the layout of the machinery is given in the floor plan. There are three sets of rotary converters, with three air blast transformers and reactance coil in each set, each transformer having a primary voltage of 2,200, a secondary voltage of 430, and a capacity of 185 k. w. For supplying air for the transformers two volume air blowers with direct coupled motors, having a capacity of 10,000 cubic feet per minute each, at ¾ ounces pressure to the square inch, will be installed. In the basement beneath this machinery is an air chamber into which air will be forced by the blowers to escape through flues or openings in the floor. There is one flue under each transformer and reactance coil, and air passing through these machines will carry off the heat due to electrical losses. Three rotary converters, a set of three transformers and one reactance coil, complete the three units of this part of the plant. One of these converters has a capacity of 300 k. w., and the other two of 500 k. w. each.

Between the units of transformers, reactance coils, and rotary converters, and the boiler room wall are located a controlling benchboard, an exciter switchboard, a feeder switchboard, and an air compressor. The turbo-generators are controlled from the controlling benchboard and all indicating instruments in connection with the generators and feeders are located on it. The air compressor is motor driven and supplies air at 150 pounds pressure to the square inch for the blowing system, for cleaning the electrical equipment, and to the boiler feed pump air chambers. Along the south end of the electrical room are located the "G. E., type K, form 3" oil switches by means of which each of the turbine generators and rotary converters is connected with the station bus. To this bus are connected switches of the same type controlling the feeder circuits for power for the entire handling plant.

CURRENT COMMENT

Totem pole electroliers will be an illuminating feature of the Seattle exposition. There will be 30 of them. These totems with lights suspended from the beaks of the birds will be placed on Rainier avenue.

Patent Records Were Broken on April 20th and 27th of this year. Patents issued under date of April 27th aggregated 805; of these 805 patents, 125 were electrical, 47 being assigned to the General Electric Company.

Cheap power prevails in British Columbia, according to a recent four-hour test made at the Kamloops, B. C., power house; 2.460 pounds of fuel were consumed with an average load of 95 k. w. per hour. To this was added 9 per cent for current distributed aside from meters, so that the cost of fuel worked out well under one cent per unit.

Destruction of Canadian Telegraph Systems, particularly in the Yukon and Northern British Columbia due to damage from snow slides, rock slides and blizzards may bring about the installation of wireless systems where such troubles are most prevalent. Last year's receipts were $122,432.53 compared with an expense account of $386,567.34.

The conservation of water power has led to the issuance of an order from the Department of the Interior, Washington, D. C., that the Director of the Geological Survey shall ascertain what waterpowers are in the public domain, and not within the bounds of the national forests, for the purpose of taking such steps as may be necessary to procure legislation by Congress to control and regulate the disposition of these sites.

The California Railroad Commission, it is announced, will, in formulating rules for the regulation of traffic on both electric and steam railroads operating in California, follow as far as possible the precedent of the Interstate Commerce Commission. The jurisdiction of the commission over interurban street railways has been questioned, the matter being brought up by the Pacific Electric Company, of Los Angeles, the Oakland Traction Consolidated, and the Sacramento Gas, Railway & Electric Company, of Sacramento.

The new side-rod electric locomotive which is described elsewhere in this issue represents a reversion in all of its mechanical details to long-established steam-locomotive practice. The wheel arrangement, with a four-wheel bogie truck at one end, three pairs of coupled driving wheels and a two-wheel radial pony truck at the opposite end, is exactly the same as that commonly designated as the "Pacific" type by steam-locomotive designers, and is the type which has been generally adopted for heavy high-speed passenger service. With the exception of the bearings for the jack shafts to which the motor connecting rods are attached, the trucks, frame, spring equalizing system and the wheels and axles are precisely the same as are used on a steam locomotive.

Electrification of Berlin railways is under consideration by the Berlin Railway Administration. The plans include the conversion of the circle and suburban railways and require the erection of two large power plants.

The Alaska telegraph service will be reinforced by 41 signal service men, who left Omaha on May 11th, having just finished their course in telegraphy at Fort Omaha. They will relieve men who have finished their time in Alaska and take up the work of improvement to be made in the existing telegraph service.

Government Fire Patrol in Southern California requires considerable extension of the existing telephone system. Every effort is being made to hurry the extension of this system in view of the fact that the dry season is fast approaching and the danger from forest fires is becoming imminent; during the past winter 45 miles of telephone line has been installed, bringing into instant communication practically all of the ranger headquarters. The work has been done entirely by the local rangers assisted by a telephone expert from the San Francisco office. Although designed for use in connection with the fire patrol, service is available for use of the local settlers when such service will not interfere with the interests of the government.

The duty on carbons will be increased if the Aldrich tariff bill is passed in its present form. The New York Post gives an instructive example of the manner in which the tariff is being revised:

> One of our correspondents called attention the other day to the dishonest juggling with the duties on carbons for electric lighting. The present duty is 90 cents per 100 pieces. The Payne bill changed this to 35 per cent ad valorem. Then came Aldrich and made it a specific duty again of 70 cents per 100 feet. Even the experts of the finance committee apparently did not notice the introduction of that word "feet," and in their comparative estimates wrote gravely that the existing duty is 46.79 per cent, while the Aldrich rate would be only 36.39—as if, in other words, there were a reduction from 90 to 70 cents a hundred pieces. But what are the facts? Carbons are imported in two foot lengths, so that the new duty would really be $1.40 a hundred instead of the existing 90 cents. Now, does anybody suppose that this was an accident?

Following the discussion of the above point in the press, Senator Smoot, acting for the Finance Committee, proposes a change of 35 cents per 100 feet on carbons made of petroleum coke, and 65 cents per 100 feet on all other carbons for electric light purposes.

This at first sight looks like a material reduction, but in fact it is only a reduction of 5 cents per 100 feet, because carbons made of petroleum coke are neither manufactured in Europe nor imported; in other words, a substantial reduction of duty is proposed on an article not imported, while the article which is imported is even with 65 cents per 100 feet duty just as much excluded from importation as it would be at 70 cents per 100 feet.

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Train Control

Perhaps the most notable addition to the literature regarding the mechanical operation of railways that has appeared in recent years is the report on an exhaustive series of tests on the air-brake equipment of an eighty-car train on some of the heaviest grades on the California system of the Southern Pacific Railroad. To a railroad man this bulky report is replete with valuable information. But like many an unfamiliar subject it requires an equally voluminous explanation to be understood by the uninitiated. Such interpretation has been made by Mr. W. S. Bartholemew in the course of an informal talk before the San Francisco Section of the American Institute of Electrical Engineers which begins in this issue.

One of the most novel features emphasized is that the essential function of the air brake is not so much to stop cars as it is to facilitate their movement. This is particularly requisite in the case of electric traction where cars must be run on short schedule with frequent stops. A further demand is that of increased carrying capacity with corresponding safety. The main object of the tests was to demonstrate the fact that the new type L, triple valve air brake minimizes the damage to goods and car structure.

In tracing the development of the air brake from its rudimentary stage it is shown that the difficulty to be met has ever been one of increasing area or distance, thus resembling the corresponding problem in the case of the transmission of electric power. The great trouble has been the drop in pressure or "differential" which occurs with increasing length of trains to be handled. It is interesting to note the manner in which this apparent shortcoming was finally used to actuate the triple function of the latest type of brake, first in charging the system, then applying the brake, and finally in releasing the brake pressure. This has all been so nicely adjusted that a long train can be brought to a standstill within its own length without serious jar, each car stopping simultaneously. On the reverse the train is started without breaking in two. This problem is complicated by the element of time necessary to restore pressure,—the inertia, as it were, whereas electric action is almost instantaneous. Furthermore, there is the question of standardization which requires that the system be applicable to any type of equipment, whether new or old. This is like making interchangeable every dynamo, motor and transmission line made in the last twenty years.

The results show that much greater tonnage can be safely handled on heavy grades, thus accelerating the movement of traffic over congested mountain grades. An eighty-car train running at thirty miles per hour was stopped in 1700 feet with a reduction of only five pounds in train-pipe pressure.

Incidentally the paper contains one of the best tributes ever paid to the advantages of oil over coal firing in maintaining speed uniformity, the fireman being able to keep steam at a predetermined pressure from the beginning to the end of the run. The final result stands as an object lesson as to what may be accomplished against what are apparently insurmountable difficulties.

PERSONAL.

C. A. S. Howlett of the Western Electric Company, Chicago, has been elected president of the National Sales Managers' Association.

Ernest B. Kost has resigned from the staff of the Washington Water Power Company to become commercial agent of the Northern Idaho & Montana Power Company, with headquarters at Sandpoint, Idaho.

G. I. Kinney of the San Francisco office of the Fort Wayne Electric Works, is distributing an excellent brand of cigars among his numerous friends in commemoration of the arrival of a 9¼-pound baby boy. The youngster's first birthday was May 19th, 1909.

A. W. Hitchcock, in charge of the insurance inspection of the Western Electric Company, with headquarters at New York, is now in San Francisco making his annual inspection of the property of the Western Electric Company on the Pacific Coast.

A. S. Kalenborn, formerly with the California Gas & Electric Company, San Francisco, is now located in Reno, Nevada, engineer of operation and construction for the Truckee River General Electric Company and the Reno Power, Light & Water Company.

J. L. Muller, who filled the position of chief clerk of the Western Electric Company, San Francisco, during the exciting days following the San Francisco fire and who has more recently been connected with the St. Louis house of the Western Electric Company in the same capacity, recently severed his connection with that company and is now filling a position in the clerical department of the American Telephone & Telegraph Company, Boston.

F. H. Poss of the San Francisco office of the Holophane Company leaves for the East on June 2d, where he will attend the annual convention and summer outing of the Sales Department of the Holophane Company at Association Island, New York. He will then visit the factory of the Holophane Company and several important cities of the East, returning to San Francisco after a trip to cover a period of about four or five weeks.

R. B. Daggett, Pacific Coast manager for the Electric Storage Battery Company, Philadelphia, Pa., has returned from an extended trip throughout the Northwest in which he covered Portland, Tacoma, Seattle and Spokane. While in Portland and Seattle Mr. Daggett participated in the meetings held by those interested in the electric vehicle industry in the Northwest and reports a great deal of enthusiasm in this direction.

A telegram brings the welcome news that T. E. Bibbins of the San Francisco office of the General Electric Company won the National Cup in the Golf Tournament of Sales Managers of the General Electric Company, held at Pittsfield, Mass., under date of May 18th. The match was participated in by all the company managers in the United States and is an important annual event with this company. The numerous friends of Mr. Bibbins on the Pacific Coast are very much elated over the news and numerous congratulatory telegrams have been sent him. This is the second cup that Mr. Bibbins has won so far during the present month, he having been the victor in the tournament of the Pacific Coast Electric Jobbers recently held at Del Monte, Cal.

W. F. Goble has been appointed superintendent of the mechanical department of the Los Angeles & Redondo Railway, Los Angeles, Cal. Mr. Goble entered the employ of the Los Angeles & Consolidated Electric Railway, which later became the Los Angeles Railway, as a car repairer in August, 1892. In 1894 he was appointed night foreman of the company, a position from which he resigned in 1897 on account of ill health. In 1898 he entered the employ of the Main, Fifth & San Pedro Street Railway, Los Angeles, as mechanical foreman. Subsequently the property of this company was purchased by the Los Angeles Railway and he again entered the employ of the Los Angeles Railway, this time as an inspector in charge of the overhauling work. When the Pacific Electric Railway opened its Long Beach line Mr. Goble equipped the cars for service and remained with the company as general car inspector until 1903, when he again entered the employ of the Los Angeles Railway as general foreman under Mr. E. L. Stephens, master car builder of the company. On January 1, 1907, Mr. Goble was appointed general foreman of the Los Angeles & Redondo Railway, and on April 1, 1909, was appointed superintendent of the mechanical department of the company.

OUTING OF THE CONTRACTORS.

The San Francisco branch of the National Electrical Contractors' Association will hold its tenth annual outing at Fairfax Park on Saturday, May 29th, 1909.

The following joint committe is in charge of the outing: W. S. Hanbridge, C. E. Wiggin, P. Decker, L. R. Boynton, W. W. Hanscom.

An interesting program has been arranged which will offer opportunities for every one in attendance to win a prize. The program is as follows:

9:00 a. m.—Leave via Sausalito Ferry.
10:00 a.m.—Arrive at grounds.
10:00 a. m. to 12 m.—Make yourselves at home.
12:00 m.—Lunch.
1:30 p. m.—Ball game between the Jobbers and Contractors.
2:00 p.m.—Races:
First—Men's heavyweight.
Second—Women's middleweight.
Third—Men's lightweight.
Fourth—Women's lightweight.
Fifth—Boys 16 to 20 years.
Sixth—Girls 12 to 15 years.
Dancing all day in the pavilion.
5:00 p. m.—Distribution of prizes.

Outings held in previous years, particularly 1908, have been very successful but the committee in charge claim that the coming outing will eclipse them all.

The weather department has been consulted and assures a pleasant day with no possibility of rain. Every electrical house, including Jobbers as well as Contractors in the Bay cities will close on May 29th and turn out in a body and the contractor for one day at least will be supreme.

GENERAL ELECTRIC COMPANY'S BALL TEAM DEFEATED.

The baseball team of the San Francisco office of the General Electric Company met its waterloo on May 8th when it was defeated by the team of the John A. Roebling's Sons Company in a spectacular thirteen inning game by a score of six to five.

The Roebling team has a number of victories to its credit annexed this year from the businessmen's teams and is willing and anxious to hear from other possible victims.

NEW CATALOGUES.

The Ohio Brass Company, Mansfield, Ohio, has issued catalog No. 20, which is devoted entirely to catenary construction. This catalog not only illustrates materials in detail with numerous views of installations, but also contains much valuable information on engineering features. The latter data gives the proper calculations and allowances to be made for different forms of catenary construction and for the ordering of material.

TRADE NOTES.

Pacific Electric Railway, Los Angeles, Cal., it is reported, will build 50 new cars in its own shops.

The Record and Guide of New York City is forwarding to its subscribers a list of buildings that are to be erected in New York this year which will amount in round numbers to about $75,000,000.

The Allis-Chalmers-Bullock Company have the contract for putting in the turbine and generator at the city power plant of Nelson, B. C., to complete the second unit at Bonnington Falls. Estimated cost, $75,000.

Evans & Dickson, electrical engineers and contractors, Tacoma, Wash., have leased a large room at 721 Commerce street for a warehouse and shop for construction work and are fitting it up with machinery and stock.

The San Francisco office of the Standard Underground Cable Company of Pittsburg, Pa., will, on about June 15th, move from its present location in the Shreve Building, to the new First National Bank Building.

The contract for the police signal patrol system for Vancouver, B. C., has been awarded to the Gamewell Company, an American concern, at $12,647. The Northern Electric Company of Canada tendered at $12,200.

The Metal Finishing Company of Union City, Conn., manufacturers of Insulator Pins, Brackets and Cross Arms, announce the opening of a New York office at 24 State street, in charge of Messrs. L. W. Brownrigg and C. M. Stevenson.

The Holabird-Reynolds Electric Company of San Francisco are making preparations to occupy the new three-story and basement building, 523-525 Mission street, now under construction especially for them, and which they expect will be ready for occupancy some time in July.

The Oregon Electric Railway, Portland, Ore., has begun work on its depot at Forest Grove. The building will be in the shape of a triangle and will be 94 ft. 6 in. x 16 ft. on the west end and 52 ft. 10 in. on the east end. There will be 44 ft. on the west end occupied by waiting room and ticket office.

The American Conduit & Manufacturing Company, Pittsburg, Pa., announce the appointment of Otis & Squires, 155 New Montgomery Street, San Francisco, as their Pacific Coast agents. This company manufactures wireduct, the new flexible conduit recently placed upon the market. A complete stock will be carried in San Francisco.

The Holabird-Reynolds Electric Company will open a supply house in Seattle, Wash., on June 1st, where a general stock of electrical supplies, including the various lines for which they are agents on the Pacific Coast will be carried. This house will be under the management of E. J. Dwyer who has for some years occupied a position with the San Francisco Sales Department.

For the ten months ending January, 1909, Canada's imports in electric motors, generators and sockets totalled $270,000. Out of this $245,000 came from the United States, while $17,000 was imported from Great Britain. In other electric supplies United States exports to Canada amounted to $1,300,000. Great Britain sent in $49,000. Germany and France supplied almost the same amount of $4,000.

One of the features to be carefully looked into where electric switches are concerned is simplicity. If all the little springs and catches can be done away with a great deal is accomplished.

Krantz Manufacturing Company has lately placed before the public a ceiling switch which is simplicity itself. It is worthy of consideration.

The Holabird-Reynolds Electric Company of San Francisco have augmented their selling force materially during the past week by the addition of J. E. Crilly, formerly with the Brooks-Follis Electric Corporation, and R. Holterman, recently connected with the California Electric Construction Company and George Battee of the John G. Sutton Company.

The Dean Electric Company, manufacturers of telephone apparatus of Elyria, Ohio, will make no exhibit at the coming Alaska-Yukon-Pacific Exposition, but in lieu of such an exhibit are calling attention of the trade to the numerous plants installed by them in and around Seattle that can be conveniently reached by a short trip and will well repay a visit.

The Westinghouse Electric & Manufacturing Company will make no special exhibit at the coming Alaska-Yukon-Pacific Exposition, but will call the attention of visitors to the installation of the power house on the Exposition grounds which is completely equipped with Westinghouse apparatus and three bar wound secondary induction motors driving the centrifugal pumps for furnishing water to the Exposition grounds.

The Moran Engineering Company, Inc., general contractors, engineers and machinery merchants, of Seattle, are temporarily located in the Maynard building. On July 1 they will move into their own building, at 1242 to 1246 First avenue south. John W. Moran, president, is a son of Robert Moran, one of the founders of the Moran Company. James D. Mudge, vice-president, and Harold G. Stem, secretary, were formerly managers of the engineering and machinery departments, respectively, of the Caldwell Brothers Company; all are well and favorably known to the general trade.

The D'Olier Engineering Company, Philadelphia, has secured a contract from the United States Government for a complete hydro-electric plant at Fort Yellowstone, Yellowstone National Park, including penstock and concrete power house. This installation will be used for furnishing light and power throughout Yellowstone Park and will consist of three 150-kw. alternating current, 3-phase, 60-cycle generators, each direct connected to a 280 horsepower D'Olier Francis turbine water wheel which will operate under a head of approximately 275 feet. A complete switchboard and the transmission wiring are included in the contract.

The Dean Electric Company of Elyria, Ohio, have closed a contract with the Rochester Telephone Company of Rochester, Indiana for a complete common battery multiple central office equipment. The apparatus includes an immediate installation of seven hundred lines with fifteen hundred ultimate and forty-five rural lines; a main distributing frame; relay rack; wire chief's test panel and power plant are included in the contract.

In conection with the above equipment they will install at the same time one of their standard No. 18 cabinets to handle an ultimate capacity of 40 toll lines.

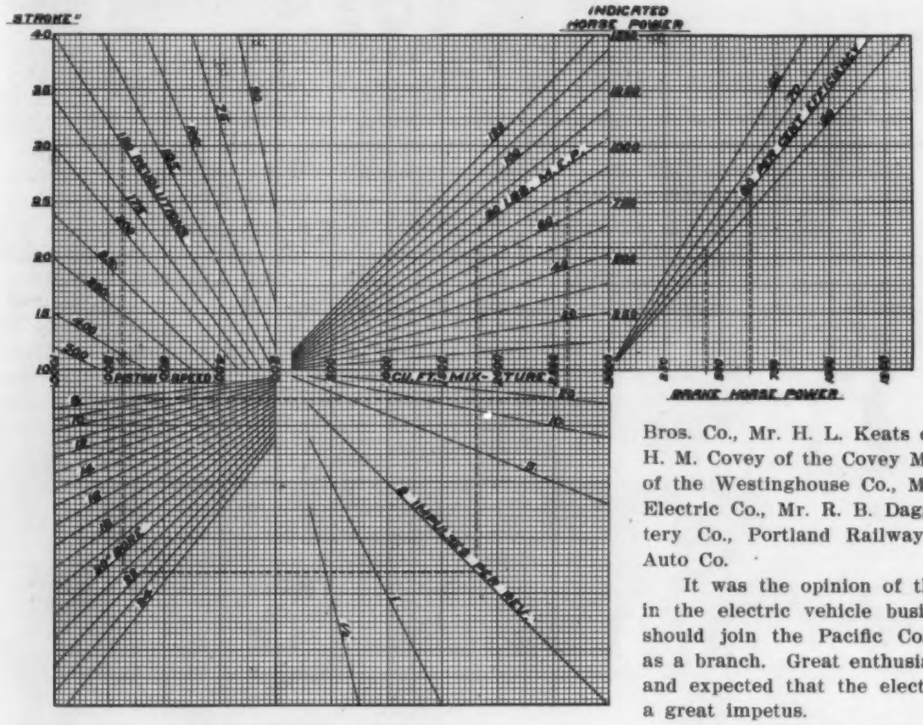
Preliminary reports for the month of April of the business done by the Western Electric Company show that it was considerably better than for the month of March, which in itself had been the best month since the beginning of the fiscal year, December 1, 1908. While it is stated that the company is consuming considerably more copper than it did several weeks ago, it is not as yet taking more than 50 per cent of the normal amount. A representative of the company stated that the business in all branches was very satisfactory, that orders were coming in rapidly and that the plants were increasing the number of workmen every day. Business for telephone apparatus has been especially large, and many valuable orders have been received for equipment and for switchboards.

GAS ENGINE HORSEPOWER AND CYLINDER DIMENSION DIAGRAM.

BY LEIGH M. GRIFFITH.

The estimation of the power capacity, or inversely, the determination of cylinder dimensions, of internal combustion engines is more inexact and requires a larger experience to secure satisfactory results than do like calculations when steam is the working fluid. This is particularly true when the engine under consideration differs materially in size or construction from existing machines which have yielded the test data to be used. Even, as in the great majority of cases, where the design conforms closely to what may be called standard practice, approximate results only can be obtained.

When, however, calculations are based on carefully obtained test data of existing machines of identical design and of both larger and smaller capacity than the unit under consideration, the probable error will be reduced to the minimum. Generally, where proper consideration has been given to the variables and problems peculiar to the case in hand, results close enough for ordinary commercial purposes are not difficult to obtain.



Cylinder Dimension Diagram.

In the accompanying diagram is shown a means of quickly getting rough values of the principal cylinder dimensions and engine functions. The variables involved naturally arrange themselves in groups thus:

Cylinder bore,
Piston speed.....Stroke and revolutions.
Impulses per revolution,
Indicated h. p.....Brake h. p. and mech. efficiency.
Mean effective pressure.

The complete solution involves the knowledge or assumption of four of the main group and one of each secondary pair. The diagram may be used to obtain values of any variable if a sufficient number of the remainder are known or assured.

The cubic feet of mixture values should be decreased by from 8% to 35%, depending on gas velocity, valve design, etc. When using the diagonals of 5, 10 and 20 impulses per revolution, divide the result by 10, as they are simply inserted to give increased accuracy to the small readings. In the absence of reliable data, values of the mechanical efficiency and mean effective pressure may be assumed with the following table as a guide. The figures are based on good design and on the range of sizes commonly run with the fuel named.

Fuel burned.	Mech. Eff. %	M. E. P. lbs.
Producer gas	80 to 85	85 to 95
Lighting gas	76 to 80	80 to 100
Gasoline and light distillate.....	75 to 82	75 to 105

THE ELECTRIC VEHICLE IN THE NORTHWEST.

In line with the general interest shown in the electric vehicle industry throughout the entire country those associated with this line of business in the Northwest are doing some active work towards the development of the electric vehicle business.

A preliminary meeting to discuss the situation was held at Portland, Ore., on the evening of April 22. Mr. H. L. Keats of the Keats Automobile Company of Portland took the initiative in the movement, the first meeting being held at the Commercial Club, which included a dinner and an entire evening spent in discussing the subject.

Those present were: Mr. A. C. Downing of Studebaker Bros. Co., Mr. H. L. Keats of the Keats Automobile Co., Mr. H. M. Covey of the Covey Motor Car Co., Mr. C. L. Wernicke of the Westinghouse Co., Mr. J. A. Cranston of the General Electric Co., Mr. R. B. Daggett of the Electric Storage Battery Co., Portland Railway, Light & Power Co., Electric Auto Co.

It was the opinion of the meeting that those interested in the electric vehicle business in the Northwest territory should join the Pacific Coast Electric Vehicle Association as a branch. Great enthusiasm was aroused and it is hoped and expected that the electric vehicle business will receive a great impetus.

On the evening of April 26th the electric vehicle people of Seattle and Tacoma met at the Olympus Cafe in Seattle where the meeting at Portland was duplicated. Seattle has in operation about 75 electric vehicles and Tacoma about 12. Judging from the interest taken and the enthusiasm of those present at this meeting, the outlook for the electric vehicle business in Seattle and Tacoma is very bright.

The views of the representatives at the Seattle and Tacoma meeting coincided with those at the Portland meeting in that the Northwest people should all became associated with the Pacific Coast Electric Vehicle Association and that their interests should be looked after by a board of managers to be established later.

Mr. E. A. Boardman was selected as temporary secretary for the Seattle section to assist the officers of the association in carrying on the work, and also to arrange for cooperation with the Northwest Electric Light Association at its next convention, which will be held in Seattle on the 6th, 7th and 8th of September. The Pacific Coast Electric Vehicle Association was invited to present a paper at that time and this invitation will be accepted.

Those present at this meeting were as follows: A. C. Downing, Studebaker Bros. Co.; Louis P. Zimmerman, Elec. Trans. Co.; Thos. F. Jack, Westinghouse Electric Co.; H. B. Dunn, Seattle & Tacoma Power Co.; H. S. Manning, The Seattle Electric Co.; A. F. Boardman, Couple Gear Truck

Co.; C. R. Hooper, Couple Gear Truck Co.; H. H. Alcock, Studebaker Bros. Co., N. W.; R. B. Daggett, Electric Storage Battery Co., San Francisco; F. A. Wing, Broadway Auto Co.; W. J. Grambs, Seattle Electric Co.; C. J. Zintheo, Electric Transportation Co.; F. V. Denton, Seattle Electric Co.; A. S. Moody, General Electric Co.; R. M. Arms, Seattle Electric Co.; N. A. Brown, Tacoma, Wash., No. 813 Division ave.; C. S. Mantell, Studebaker Bros. Co., N. W.; P. F. Sands, Studebaker Bros. Co., N. W.; T. M. Kollock Jr., Westinghouse Electric & Manufacturing Co.

Indications point to the opening of an exclusive electric garage in Tacoma and one or two in Seattle in the near future.

The electric vehicle business in Spokane is in its infancy. The officials of the Washington Water Power Company, however, have shown considerable interest in this business and will make an effort to bring the advantages of the electric vehicle before the people of Spokane in the very near future. It is probable that an exclusive electric garage will also be established in Spokane soon.

ELECTRIC AUTOS IN ROCHESTER, N. Y.

In opposition to the listless attitude of companies in many cities, the Rochester Railway and Light Company has adopted a policy of vigorous promotion of the electric automobile.

It installs a separate clock meter in public and private garages and gives a four cent rate on current used for battery charging between the hours of 9 p. m. and 6:30 a. m. It maintains a department for the inspection of batteries employing a high-salaried expert who periodically inspects all machines free of charge.

The attitude of this company is largely responsible for the fact that in Rochester one sees almost as many electric as gasoline machines and the company derives a nice revenue from this off peak load.—Selling Electricity.

ELECTRICAL EXPERT (Wireless Telegraphy and Telephony)

The United States Civil Service Commission announces an examination on June 9, 1909, to secure eligibles from which to make certification to fill a vacancy in the position of electrical expert (wireless telegraphy), in the Bureau of Equipment, Navy Department, at a salary of $3000 per annum, and vacancies requiring similar qualifications as they may occur.

Competitors will not be assembled for any of the tests.

The duties of the appointee to this position will be as follows: To have charge of the laboratory tests of all instruments and apparatus pertaining to wireless telegraphy; the standardization of circuits and instruments used in wireless; the development of special apparatus and methods of wireless signaling suited to special conditions, and of new forms of sending and receiving circuits; to inspect the various wireless stations and to make the necessary measurements of their electrical constants; to carry on quantative experimentation and original investigation in wireless telegraphy, and, in general, to carry out such work as may be necessary for the development of the science.

The examination will consist of the subjects mentioned below, weighted as indicated:

Subjects.	Weights.
1. General and technical training	10
2. Technical experience	20
3. Special experience in wireless telegraphy and telephony	40
4. Original research and experiments in electrical science with special application to wireless telegraphy and telephony	30
Total	100

Competitors who fail to receive a rating of at least 70 per cent in the third subject will not be eligible for appointment.

Age limit, 21 years or over on the date of the examination.

This examination is open to all citizens of the United States who comply with the requirements.

This announcement contains all information which is communicated to applicants regarding the scope of the examination, the vacancy or vacancies to be filled, and the qualifications required.

Applicants should at once apply to the United States Civil Service Commission, Washington, D. C., for application Form 304 and special form. No application will be accepted unless properly executed and filed, with the material required, with the Commission at Washington prior to the hour of closing business on June 9, 1909. In applying for this examination the exact title as given at the head of this announcement should be used in the application.

NEW BUILDING AT PORTLAND, ORE.

The building of the Portland Railway, Light & Power Company's structure at the northeast corner of Alder and Seventh streets, has reached a stage that begins to show above the line of the sidewalk.

The present three-story building will soon be razed to the ground, leaving only a temporary covering for the big plant of the electric company while the nine-story edifice is being erected.

The building is to be of nine stories. The basement is to be used for cell installation, switches, etc.; the first floor as a substation "A," the main entrance to the building and a store where will be displayed electric appliances, now exhibited on Seventh street in the Calumet Hotel building. The main entrance is to be next the Oregonian building and will lead to the general stairway and two elevators to connect with the upper stories.

The mezzanine story will also contain rooms for the display of electrical appliances and the third floor will be given over to the superintendent of lighting and power and the superintendent of railways, with their assistants and clerical forces.

The fourth floor will be occupied by the accountants and the fifth by the general officers of the company, the president, vice-president and other principal officers. The floors above will be let to tenants for offices.

Work has been started on the wrecking of the building that has occupied the corner for several years. Temporary protection is given to the equipment already installed on the first floor, by substratum of heavy, reinforced concrete. The cost is placed at approximately $250,000, and is to be ready for occupancy January 1, 1910.

PORTLAND SECTION A. I. E. E.

As the result of an energetic campaign there are now nearly fifty members of the American Institute of Electrical Engineers in Portland, Oregon, and they have sanguine hopes that a charter will be granted them to establish a section in that city. Early in January of this year there were but twelve members, but since then thirty-five applications have been filed. Several meetings have been held to discuss papers from the proceedings. On March 16, Mr. L. M. Antoine read a paper on "Automatic Telephony," supplemented by a visit of inspection to the plant of the Home Telephone Company. On April 20th Mr. E. R. Lundius described the fire in the switchboard of the Pacific Telephone & Telegraph Company, and on May 18th Mr. O. P. Guldemeister presented a paper and demonstration on "Wireless Telegraphy."

The executive committee consists of O. B. Coldwell, W. Spaulding, S. Ring, W. M. Hamilton and L. B. Cramer. Mr. Coldwell is chairman and Mr. Cramer secretary.

SEATTLE SECTION A. I. E. E.

Professor C. E. Magnusson of the University of Washington presented a paper on the "Effects of Electrolysis in Reinforced Concrete," May 15, before the Seattle Section of the American Institute of Electrical Engineers.

SIXTH ANNUAL CONVENTION NATIONAL ASSOCIATION OF STATIONARY ENGINEERS.

THE California State Association of the National Association of Stationary Engineers will hold its sixth annual convention during the week of June 14th to 19th, inclusive, in the Auditorium, Page and Fillmore streets, San Francisco. In conjunction with the regular annual convention, arrangements have been made to hold a Mechanics' Fair. The main floor of the Auditorium has been subdivided into booths which have been leased to all the great manufacturing firms doing business on the Pacific Coast, and the latter have promised to make this exhibition at least the equal of any ever seen in San Francisco.

Engineers with their families and friends will be here from the entire Pacific Coast and the committee in charge report everything in readiness to receive them. Prior to 1882 the steam engineers of the United States were disorganized and unknown, but in that year a few engineers led by M. C. Beckerleg of Chicago, met and organized The National Association of Stationary Engineers, and adopted the following preamble which was written by Mr. Beckerleg and has never been changed:

Preamble.

This association shall at no time be used for the furtherance of strikes, or for the purpose of interfering in any way between its members and their employers in regard to wages; recognizing the identity of interests between employer and employee and not recognizing any project or enterprise that will interfere with perfect harmony between them. Neither shall it be used for political or religious purposes. Its meetings shall be devoted to the business of the association, and at all times preference shall be given to the education of engineers, and to securing the enactment of engineers' license laws in order to prevent the destruction of life and property in the generation and transmission of steam as a motive power.

The N. A. S. E. stands unique among the industrial organizations of the world as being the only one having such a preamble, and the wisdom of its adoption has been proven by the fact that wherever its provisions have been strictly abided by, success has followed. The California Association No. 1 was instituted in March, 1883, with twelve charter members, only one of whom, Conrad Witzel, is now living. The first meetings were held on the top floor of the Masonic Temple, Montgomery and Post streets, and from this small beginning the organization has grown until at the present time there is a chain of associations located in the various cities from Los Angeles to Vancouver. As the preamble so clearly enunciates the primary and chief purpose of the N. A. S. E. is the education of its members in the details of the profession of steam engineering and so successfully has it fulfilled this mission that many of its members now rank as the most successful and highest paid members of the engineering profession.

The convention committee have adopted the following motto: "Boost for the Engineers, Boost for California, and particularly boost for San Francisco."

San Francisco No. 1, N. A. S. E., at its meeting of Thursday, May 13th, listened to an extensive report from the State Convention Committee of Arrangements, which showed very encouraging progress.

The committe on securing a meeting hall reported in favor of the rental of Carpenters' Hall, on Fulton street and the association voted to accept that proposition. The first meeting in June will be held in the new quarters.

JOINT STATE CONVENTION COMMITTEE OF THE NATIONAL ASSOCIATION OF STATIONARY ENGINEERS

Upper Row, left to right—B. E. George, H. W. Noethig, M. W. Herzog, John Traynor, John W. Carter, J. L. Davis, W. T. Bonney, Wm. Jenkins. Lower Row, left to right—J. E. Green, Secretary A. C. Arbuckle, President P. L. Ennor, Treasurer Charles Dick, Business Manager E. D. Brewer.

June 10th was set as the date for a "smoker" and housewarming, and also as a birthday party to Brother Conrad Witzel, the only surviving charter member of No. 1 of California. Refreshments and entertainment will be provided.

Discussion as to the proper amount and placing of air openings in grate surface for oil burning was introduced by Brother Bonney and various members talked on the subject, developing some valuable information. Brother Chas. Bankey illustrated on the blackboard the setting and burner arrangement which proved most successful in an extended experience, and experiment when designing a system of furnace control for oil burners in his plant before the fire.

OBITUARY.

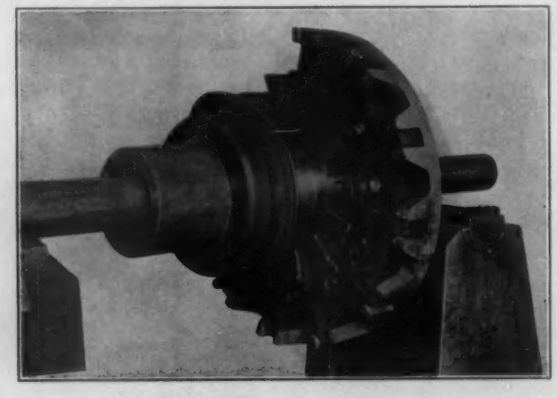
We regret to record the death of Ira Watts, who died of Bright's disease, on April 15th, at Spokane Falls, Wash. He was 49 years of age, and was born in Malden, Mass. About three years ago he removed to Spokane Falls, where he was engaged as consulting engineer. Mr. Watts was for 12 years secretary-treasurer of the Life and Accident Department of the N. A. S. E. and a member of James Watt No. 7 of the same organization. He also instituted an association of this order at Spokane Falls.

INDUSTRIAL

A NOVEL ELECTRIC LOCOMOTIVE.

The accompanying photographs illustrate a novel type of electric locomotive which has been designed jointly by the General Electric and American Locomotive Companies for trying out a scheme of transmitting power from the motors to the drivers through siderods instead of by the ordinary methods.

The locomotive is designed for a tractive effort of 30,000 pounds, at a speed of 18 miles per hour, with a maximum



Flexible Coupling Partly Assembled.

speed of 50 miles per hour and will operate equally well in either direction. It has been tried out with temporary motors of a somewhat smaller capacity and the tests have demonstrated conclusively that the design is entirely satisfactory in every way. It is proposed to extend the cab over the entire length of the machine when the proper motors are installed on the locomotive. The present cab and guards are only for the temporary protection of the apparatus now installed.

One of the principal advantages found in this type of construction is that a motor of large diameter and small air gap can be used in conjunction with small diameter driving wheels, and at the same time the motor can be spring supported. The motor bearings can be easily designed to maintain the small air gap. Such a form of construction will also secure a marked economy in the construction of the motors as the same horsepower can be obtained in two motors at a less cost and for less weight than in four smaller motors. The same motor equipment can also be used on locomotives with different diameters of driving wheels. This feature makes possible the interchange of equipment on roads where both freight and passenger locomotives of this type are employed. This type of locomotive is as well adapted for operation with direct current motors as with those of the alternating current type.

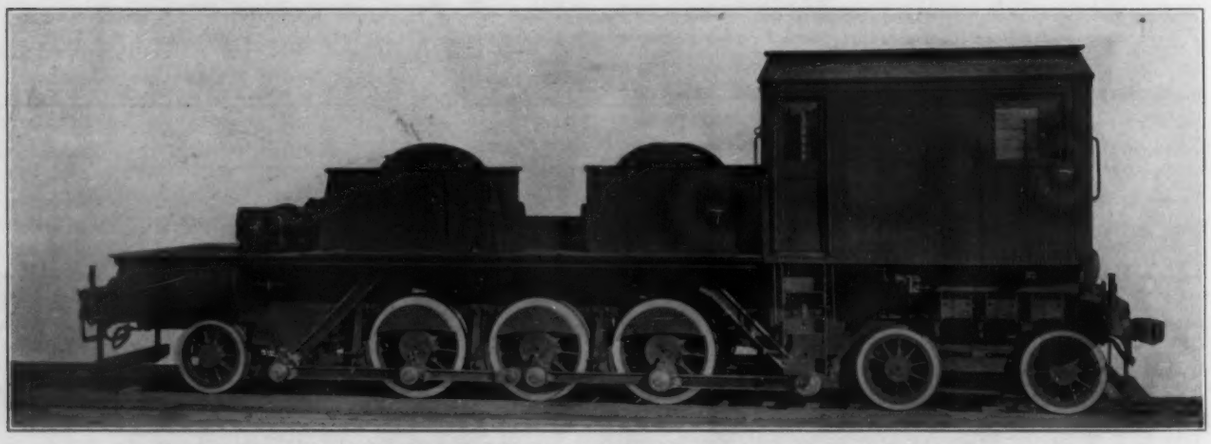
The motors in such a locomotive can be located so as to concentrate a greater proportion of the weight near the center of the machine with the attendant advantage that the moment of inertia of the locomotive around its vertical axis will be as small as possible. This will reduce the rail pressures at the leading and trailing wheels and consequently the flange and rail-head wear.

The location of the motors in the cab facilitates inspection and repairs and the renewal of brushes. The maintenance charges for the motors will also be greatly reduced as practically all road dust and other foreign material can be kept out.

The electrical control is arranged in such a manner that the motors start as repulsion motors with short circuited armatures and are changed over to series repulsion motors for the higher speeds. This arrangement eliminates running with a short circuited armature on high voltage and at the same time gives a high torque at starting. In fact the tractive effort is about twice as great with repulsion motor connections as with series repulsion connections for a corresponding current value.

The armatures are similar to those of an ordinary direct current machine with equalizer rings. They have multiple drum windings with the bars soldered directly into the commutator segments.

The field or stationary windings are of the distributed type and are made in two sections—the exciting and the inducing windings. The former has the same function as the field winding in an ordinary series motor, while the inducing winding introduces the working torque when the motor is connected as a repulsion motor.



Experimental Side-Rod Locomotive Equipped With Two 400 h. p. Motors and Temporary Cab.

All parts of the running gear such as wheels, driving boxes, axles, springs, spring rigging, trucks, etc., follow standard steam locomotive practice.

The arrangement of the siderods is shown in the illustration and it will be noticed that each motor is coupled to a jack shaft and thence to the drivers. The jack shaft bearings are rigid in the spring supported locomotive frame and their centers are on a level with those of the drivers.

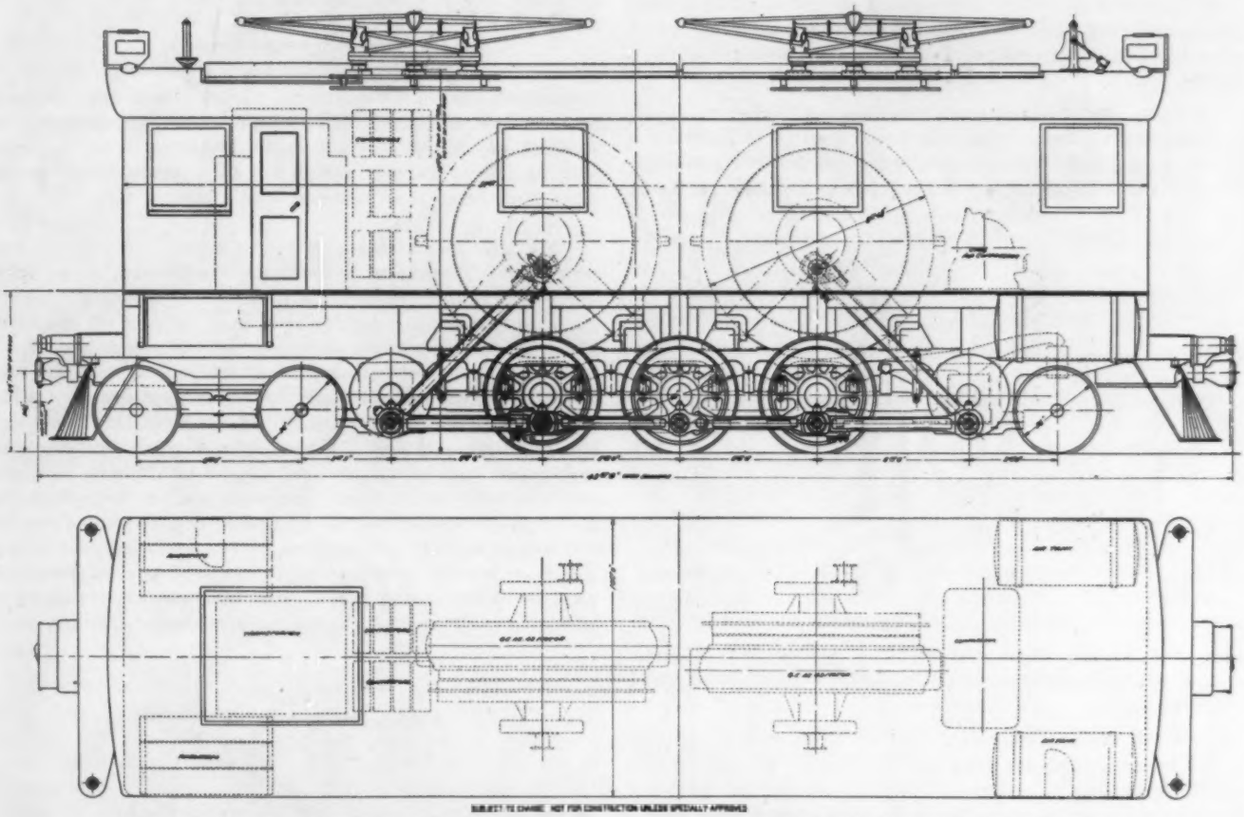
The object of this jack shaft is to permit a horizontal drive between the spring supported part of the locomotive and the driving wheels and is necessary in order to allow a vertical play of the spring supported part with a negligible variation in the distance between the crank centers.

Counterweights are used on the driving wheels to balance the siderods and it should be noticed that there are no reciprocating parts and therefore a perfect balance can be obtained.

Another interesting mechanical feature is illustrated in the photograph of the flexible coupling inserted between the armature shaft of the motor and the motor crank. This consists of a series of leaf springs arranged radially around the motor shaft and designed of such a strength as to carry the entire torque of the motor flexibly with an amount of deflection which will reduce the effect of the pulsating torque of a single-phase alternating current motor to a minimum.

The more important data is given below:

Trolly voltage	10,000
Cycles	15
Rated tractive effort	33,000 lbs.
Speed at rated amperes	18 m. p. h.
Total horsepower	1600
Number of motors	2
Type of motor	Geaz-43
Diameter of driving wheels	49"
Number of driving wheels	6
Diameter of pony wheels	36"
Diameter of bogie wheels	36"
Total wheel base	33' 6"
Rigid wheel base	10'
Length, total	43' 6"
Height	13' 8"
Weight on drivers	162,000 lbs.
Total weight	250,000 lbs.
Weight per axle, driving	54,000 lbs.



Side Elevation and Plan of Side-Rod Locomotive as Equipped With Two 800 h. p. Motors and Cab.

NEW CATALOGUES.

Booklet No. 3779, recently distributed by the General Electric Company, contains a list of this company's snap switches, and will be of interest to the general trade.

Quite an original method of advertising is being used by the Weston Electrical Instrument Company, of Newark, N. J. It takes the form of a private post card, containing a series of school talks on Weston instruments.

Pass & Seymour, Inc., Solvay, New York, have just issued in a very complete and handy form, Price List No. 174, covering their well known line of P. & S. electrical specialties. It will be mailed to those interested on request.

The Western Electric Company of San Francisco, Seattle and Los Angeles, will have ready for distribution at an early date a catalog of nearly 400 pages on its electric railway and mine supplies. It will be published in sections so that it can be distributed either in parts or as a complete publication.

The Holophane Company has issued under date of May 21st new Bulletin No. 21-A covering new discounts applying to Holophane Globes and Reflectors, Holophane-D'Olier Steel Appliances and other fittings. These bulletins will be supplied on request through their San Francisco office, 151-153 New Montgomery Street.

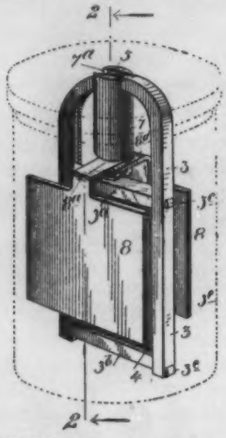
The Westinghouse Electric and Manufacturing Company has just issued Circular No. 1163 on the subject of Type DA Small Motors. It treats of the use of small motors in the home and in business and offers numerous suggestions for their use where both economy and convenience are sought. It includes also some very interesting data and general information relative to this particular line of apparatus.

PATENTS

919,744. Electric-Fuse Case. Thomas E. Murray, New York, N. Y. The combination of a tubular case closed at one end and having apertures in its wall near its open end, a fuse in said case, pulverized non-combustible material in

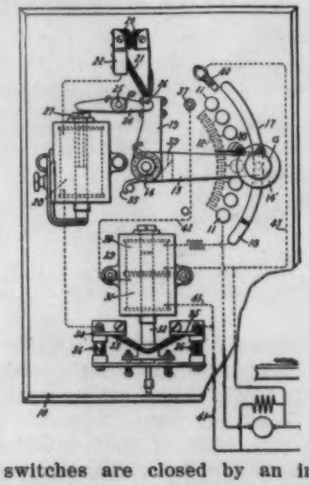
said case and embedding said fuse, a disk of hard noncombustible material within and closing the bore of said case below said wall apertures and bearing upon said pulverized material, and means within said bore for locking said disk therein.

919,900. Primary Electric Battery. George A. Lutz, Plainfield, N. J. A primary electric battery comprising a cover, a supporting rod depending from the cover, an insulating block supported by the rod below the cover, a frame



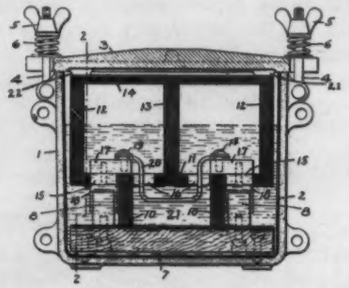
supported by the block and carrying a depolarizing plate, and a positive electrode supported by and insulated from the said rod.

919,998. Starting-Rheostat. Paul H. Zimmer, Schenectady, N. Y., assignor to General Electric Company. A starting rheostat comprising a resistance varying arm, a plurality of independently actuated switches in series therewith, means



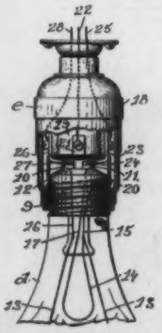
whereby said switches are closed by an initial movement of said arm, and a normally open circuit closing device in connection with said arm for controlling one of said switches.

919,563. Submerged Fuse. Charles E. Eveleth, Schenectady, N. Y., assignor to General Electric Company. A fuse submerged in liquid, and means for causing the gases produced by the blowing of the fuse to force the liquid to stream past the fuse ends. The combination with a tank, liquid therein,



a submerged baffle plate having holes, fuse terminals on one side of said plate, and a fuse located mainly on the other side of said plate and having its ends passed through said holes and attached to said terminals.

919,821. Incandescent Electric Light. Walter J. Carpenter and Thomas F. McDermott, Providence, R. I. In an incandescent electric light, a bulb having a screw threaded shell, an insulating cap on said shell, a pair of oppositely arranged spaced contact plates on the outer end face of said cap, a high and a low power filament in said bulb, a wire connecting one end of the high power and one end of the low power filament with a point on one side of said shell at a distance from said cap, a second wire connected to the other end of the high power filament extending through said shell and secured to one of said contact plates, a third wire connected to the other end of the low power filament extending through said shell and secured to the other of said contact plates, a socket composed of a shell, a central insulating block secured to said shell, said insulating block being of solid construction and having plain bounding sides, a screw



threaded shell secured to said block, a contact member secured to said block at one side thereof adjacent to said last named shell, a pair of oppositely arranged L-shaped spring contact arms secured to the block sides on opposite sides of said contact member and having their free ends extending on the under face of the block and passed through openings provided therefor in the socket shell, the free ends of said spring contact arms being spaced apart a distance approximately equal to the distance between said pair of contact plates and being adapted to seat on the outer faces of the latter, a pair of wires disposed on the outer sides of said insulating block and connected to said arms, and a third wire disposed on the outer face of said block between said pair of wires and connected to said contact member, all of said wires being disposed on the interior of said socket shell.

NEWS NOTES

FINANCIAL.

SPOKANE, WASH.—The Missoula Street Railway Company has been organized with a capital stock of $100,000. The principal office is at Spokane. A. H. Werthy, of Butte, Mont., is interested.

SAN FRANCISCO, CAL.—A special election will be held in this city on June 24th, 1909, to vote on the $2,000,000 bond issue proposed by the Board of Supervisors last week for the reconstruction of the Geary street road.

ONTARIO, CAL.—The Ontario & San Antonio Heights Electric Railroad Company has secured right-of-way and will construct a line between Uplands and Claremont, Cal., a distance of six miles. The cost of the road will be about $150,000.

WASHINGTON, D. C.—The Mercantile Trust Company of St. Louis offered the highest bid for the $1,000,000 bond issue for the construction of the City of Manila water system. The price offered was $1,022.80 for each $1,000 bond of the proposed issue.

SPOKANE, WASH.—French investors have purchased a $3,000,000 bond issue of a company which is to build an electric line seventy-five miles long in the State of Washington. The company is known as the Okanogan Electric Railway, and Albert M. Dewey of Spokane is its president. Ultimate plans call for extensions of the line which will make a system 500 miles in length.

SAN FRANCISCO, CAL.—The March report of the San Francisco, Oakland & San Jose Railway Company shows an increase of $500 in gross earnings over March, 1908, and an increase of $4,000 in net earnings. The gross earnings of the Oakland Traction Consolidated show an increase of $1,500 over March, 1908, but the net earnings have fallen off $6,000, owing to increased operating expenses, caused by the opening of new lines in Berkeley. The Oakland Traction Consolidated has announced a reduction of the fare between Oakland and Vernon station, on its California Railway branch, from 10 to 5 cents.

SAN FRANCISCO, CAL.—Details in regard to the proposed new financing by the United Railways Ivestment Company are outlined in a letter to stockholders signed by Ernst Thalman, president. A special meeting was held in Jersey City on May 17 for the purpose of ratifying and approving a contract entered into by the company with the protective committee of the Stanislaus Power Development Company. It is proposed to increase the capital stock by $10,000,000. All of the new stock will be preferred. A block of $10,000,000 of United Railroads of San Francisco common stock held in the treasury will be sold and the properties of the Stanislaus Power Developing Company acquired. A new company, to be known as the San Francisco Electric Railways, will be formed and will be controlled by the United Railways Investment Company.

INCORPORATIONS.

SAN FRANCISCO, CAL.—The Quincy Valley Water Users' Association has been formed here by J. Omeara, P. S. Anthony, D. McEwen and others.

TONOPAH, NEV.—The Springdale Water & Power Company has been incorporated here with a capital stock of $250,000 by Morris and Charles Newton.

LOS ANGELES, CAL.—The Kern Star Oil Company has been incorporated in this city by Greeley King, Francis Smitheram, F. W. Mattern and others.

EL PASO, TEX.—The Alpine Power Company has been incorporated here with a capital stock of $35,000 by R. B. Slight, H. W. Townsend and I. H. Derrick.

SAN FRANCISCO, CAL.—The White Light Oil Company has been incorporated here with a capital stock of $10,000 by L. L. Dumme, C. P. Fonda and E. R. Sullivan.

BAKERSFIELD, CAL.—The Sunset Acme Oil Company has been incorporated here with a capital stock of $200,000 by H. W. Thomas, T. M. Young and H. E. Wright.

SALT LAKE CITY, UTAH.—The Borkman Electric Company has been incorporated here with a capital stock of $25,000 by G. Borkman, P. C. Dykes and J. H. Parkes.

SAN FRANCISCO, CAL.—The Southfield Oil Company has been incorporated here with a capital stock of $500,000 by R. H. Smith, R. R. Yates, S. E. Liddle, J. K. Lynch and W. H. Humphrey.

FRESNO, CAL.—The Coalinga National Petroleum Company has been incorporated here with a capital stock of $500,000 by A. S. Cleary, G. V. Martin, F. A. Curtin, A. S. Bacon and S. R. Bosen.

LOS ANGELES, CAL.—The Westside Electric Company has been incorporated here with a capital stock of $75,000 by C. W. Anderson, R. C. Shippee, J. F. Stratton, Jacob Feiber and F. V. Gordon.

BAKERSFIELD, CAL.—The M. P. Oil Company has been incorporated here with a capital stock of $21,000 by W. B. Robb, D. E. Morgan, E. T. Powell, S. W. Marsh, M. P. Flickinger and A. S. Crites.

STOCKTON, CAL.—The Tracy Oil Company has been incorporated here with a capital stock of $500,000 by A. Graunauer, A. H. Linne, H. P. Ludwig, J. W. Brichetto, D. A. Ball, A. G. Ball and others.

OAKLAND, CAL.—The Antelope Valley Oil Company has been incorporated in this city with a capital stock of $75,000 by W. G. Hellinger, D. F. Tillman, J. G. and M. R. Mecham and M. F. Johnstone.

LOS ANGELES, CAL.—The Arrowhead Springs Water Company has been incorporated here with a capital stock of $50,000 by Dr. F. J. Nutting, R. E. Pierce, James Mumford, J. R. Haddock and C. H. Temple.

LOS ANGELES, CAL.—The Surf Light & Power Company has been incorporated here with a capital stock of $1,000,000 by C. W. Hicks, Charles Kraft, J. L. Haley, J. L. Kroeger, J. H. Maurice and others.

TRANSPORTATION.

SAN DIEGO, CAL.—E. W. Peterson has applied for an electric railway franchise on the public highways in the County of San Diego.

VENTURA, CAL.—F. M. Packard and Julian P. Jones have been granted an electric railway franchise on highways in Ventura County.

VACAVILLE, CAL.—Attorney T. C. Gregory, representing the Vallejo & Northern Electric Company, has applied for an electric railway franchise in this city.

OAKLAND, CAL.—The San Francisco, Oakland & San Jose Railway Company has been granted a franchise to operate an electric railway on Hopkins street in this city.

SAN RAFAEL, CAL.—Electric engineers and surveyors have been at work this week on a new electric road which will be built between Sausalito, San Rafael and Petaluma.

SAN FRANCISCO, CAL.—General Manager Black of the United Railroads announces that the company now has in use 12 of the 25 new cars which were ordered some time ago.

STOCKTON, CAL.—H. P. O'Dougherty, formerly manager of the San Jose & Santa Clara Railway Company, has been appointed manager of the Central California Traction Company.

FAIRFIELD, CAL.—The Randall, Wright & Trowbridge Company has been granted an electric railway francise to construct a line between Benicia, Vallejo and White Sulphur Springs.

MIDDLETOWN, CAL.—H. L. Eldridge, representing the Santa Rosa & Clear Lake Railroad Company, announces that at least five miles of the new electric road will be built within the next ninety days.

OAKLAND, CAL.—President Heron of the San Francisco, Oakland & San Jose Railway Company, announces the extension of the Key Route electric system in this city to upper East Oakland and Northern Fruitvale.

BELLINGHAM, WASH.—J. E. Morrison of Seattle says that the interurban as planned by the Nooksack Valley Traction Company from Bellingham to Blaine, via Ferndale, will be built.

PACIFIC GROVE, CAL.—Following the application of the Monterey & Pacific Grove Street Railway Company, bids will be received by the Board of Supervisors up till June 10th, 1909, for the sale of an electric railway franchise over a four-mile right-of-way between Hotel Del Monte and this city.

SACRAMENTO, CAL.—F. A. Warner, coast representative for the Smith Sierra-Sacramento Railroad Company, left this week for the east to arrange for the shipment of rails, wire, cars, and other necessary material for the construction of the electric road between this city and Lake Tahoe. The road between Orangevale and Sacramento is to be built immediately.

OAKLAND, CAL.—Work has been commenced on the new power plant of the Southern Pacific Company at Fruitvale, where power will be generated for the electric lines that are soon to be installed in Oakland and Alameda. The building will be three stories high, and will have a ground area of 128x228 feet. The structure will be of reinforced concrete to the second story, and brick for the balance of the building. The roof will be of tiling placed directly upon the steel rafters. The floors and wainscoting will be of vitrified tile. The building will be completed within the next ninety days.

ALBANY, ORE.—A new street railway franchise was introduced in the City Council on May 10th, and its probable passage at the next meeting of the Council will end the long-continued franchise war in Albany. The proposed franchise is in favor of A. Welch, who operates the present street railway line here, and will cover a number of leading streets for a period of 40 years. In consideration of receiving this new franchise, Welch will surrender the old perpetual blanket franchise, covering all of Albany's streets, which he purchased from H. Hirschberg, of Independence, and under which he is now operating.

OIL.

COALINGA, CAL.—The Lucile Oil Company has bought U. M. Thomas's interests in this district for $65,000.

COALINGA, CAL.—The Pacific States Oil Company has taken over the property of the Enterprise Oil Company.

LOS ANGELES, CAL.—Bids will be received by the City Council till June 17th, for the sale of a 21-year oil pipe franchise on certain streets in this city.

ILLUMINATION.

SAN LUIS OBISPO, CAL.—The San Luis Gas & Electric Company has a force of men at work laying 18,000 feet of new pipe.

CARLIN, NEV.—The Southern Pacific Company is now engaged in installing an electric lighting system in this place.

COALINGA, CAL.—The Coalinga Gas & Power Company has awarded F. H. Hess of Fresno a contract for erecting a $31,000 gas plant in this city.

SANTA ANA, CAL.—The Santa Ana Irrigation Company has applied for an electric power franchise over certain public highways in this county.

LOS ANGELES, CAL.—The Glendora Light & Power Company has completed arrangements for a two-mile electric light and power extension at a cost of $2,500.

SANTA ROSA, CAL.—The Snow Mountain Water & Power Company has asked for the right to construct 17.58 miles of electric line from Fulton to Guerneville.

HANFORD, CAL.—Manager E. E. Bush of the Hanford Gas & Power Co., states that a contract was let this week to R. D. Wood, of Philadelphia, for supplying an additional gas tank, with a capacity of 100,000 cubic feet.

REDLANDS, CAL.—The final transfer of the gas plant of the Edison Electric Company to the Home Gas Company and the transfer of the electric plant of the Home Gas Company to the Edison Electric Company was completed this week. A force of men is now at work making improvements to the electric systems and connecting the two plants.

NEVADA CITY, CAL.—Dr. A. H. Tickell has filed a claim for 5,000 inches of water in the Middle Yuba river with the Recorder of Nevada County, Cal. He says he will erect a large electric power plant on the stream at a point above the dam used by the Plumbago Mining Company, and will take in all the water in the stream. He intends to build on the Nevada County side of the river a plant which will generate at least 500 horsepower.

SAN FRANCISCO, CAL.—The properties of the Tuolumne Water Power Company and the Stanislaus Electric Power Company were sold at auction last week at John C. Rice of Boston, for $2,200,000. Mr. Rice representing the United Railroads Investment Company of New Jersey, a holding company of the United Railroads. A new company will be organized, the stock of which will be controlled by the United Railways Investment Company.

TELEPHONE AND TELEGRAPH.

VACAVILLE, CAL.—Henry Peters has been granted a telephone franchise on public highways in Silverville and Maine Prairie townships.

SANTA CRUZ, CAL.—Secretary Grunsky of the Rural Telephone Company announces that several new telephone lines are to be installed soon.

SANTA CRUZ, CAL.—The Loma Prieta Lumber Company has been granted the right to construct a telephone line between Swanton and Mile Creek.

BAKERSFIELD, CAL.—Following the application of the Kern Mutual Telephone Company, the Board of Supervisors will receive bids till June 7th, for a telephone franchise over public highways to the West Side oil fields.

SAN FRANCISCO, CAL.—The Board of Harbor Commissioners has fixed a monthly rental of $10 for the rights of the Western Union Telegraph, the Postal Telegraph and the Pacific States Telephone Companies to land their cables on the water front.